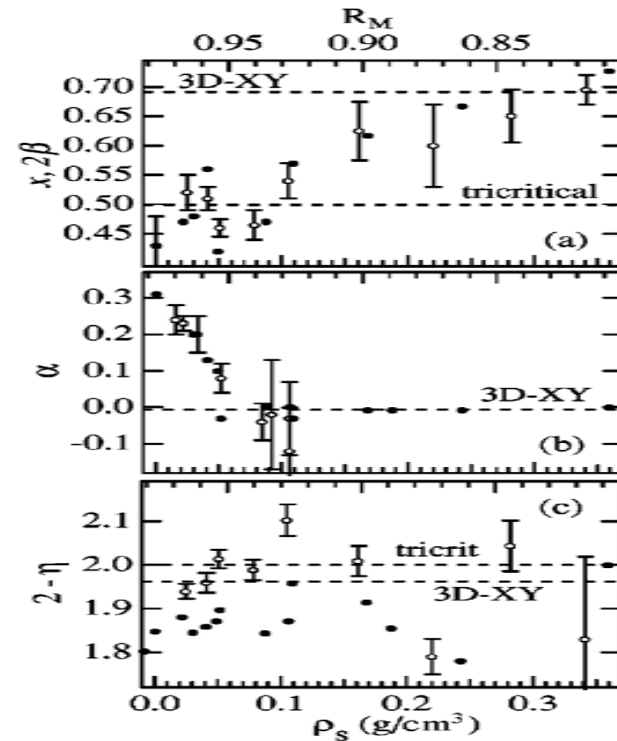


Effect of Quenched Random Disorder on Liquid Crystal Phase Transitions

Germano S. Iannacchione, WPI, DMR-0092786

The understanding of quenched random disorder (QRD) effects in nature has import in a wide variety of fields. A systematic calorimetric study has probed the effects of QRD on two different liquid crystal (LC) phase transitions. Combined with x-ray scattering results, the effect of QRD is consistent with a Random-Field model. Given the different systems studied, a Random-Field model may be generally applicable to any instance of QRD. New LC universality classes having QRD, which have not been theoretically studied, are the current focus.



Evolution of effective critical exponents of the N - SmA phase transition in 8CB+aerosil samples (open circles). Overlay is the variation of those exponents with respect to nematic range for different LC (solid circles). This equivalence, a manifestation of the Harris criteria, illustrates the field nature of the disorder in suppressing nematic director fluctuations [3,4].

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New Courses at WPI:

Thermodynamics (PH597-graduate)

Liquid Crystals (PH597-graduate and PH-ISP undergraduate)

Complex Fluids and Disorder (PH-Independent Study, ISP)

Outreach:

High-school and incoming freshman undergraduate physics lab tours

conducted by graduate students.

General demonstrations for Statistical Mechanics and Thermodynamics courses.